

AMENDMENTS TO THE CLAIMS

1-4. (Cancelled)

5. (Previously Presented) A method in a data processing system for identifying subnet address ranges for subnets being used in a network, comprising:

determining a plurality of addresses of hosts in the network;

accessing a binary tree, the binary tree having a root node having no parents, parent nodes including the root node each having a pair of child nodes, and leaf nodes having no child nodes, such that the root node represents the entire range of addresses available in the network, such that each child node in a pair of child nodes represents a distinct half of the range represented by the parent node of the pair of child nodes, and such that each leaf node represents a single network address that is within the address ranges represented by all of the ancestors of the leaf node, each determined host address being represented by a leaf node;

traversing the binary tree in preorder to identify candidate nodes such that both child nodes of each candidate node have one or more descendant leaf nodes representing a determined host address;

testing the address range represented by each visited candidate node to determine whether the address range is a subnet address range for a subnet being used in the network;

if testing indicates that a visited candidate node represents an address range that is a subnet address range for a subnet being used in a network, identifying the visited candidate node as a subnet node; and

skipping, in the traversal, any candidate nodes that are descendants of an identified subnet node.

6. (Original) The method of claim 5 wherein testing comprises, for the two subranges represented by the child nodes of the candidate node:

 sending one or more packets each from a source address to a destination address, each packet requesting a reply, the source and destination addresses being in different subranges for each packet;

 for each packet, determining whether a reply to the packet is sent directly from the destination address back to the source address; and

 if, for a number of packets exceeding a threshold number, a reply to the packet is sent directly from the destination address back to the source address, determining that the candidate node represents an address range that is a subnet address range for a subnet being used in a network.

7. (Original) The method of claim 5 wherein testing comprises, for the two subranges represented by the child nodes of the candidate node:

 selecting the address within each subrange that is closest to the addresses of the other subrange;

 determining whether the network contains a host responding to either of the selected addresses; and

 if the network contains a host responding to either of the selected addresses, determining that the candidate node represents an address range that is a subnet address range for a subnet being used in a network.

8. (Original) The method of claim 5, further comprising, before traversing the binary tree, trimming the binary tree by deleting nodes not on the path between the root node and any leaf node representing a determined host address.

9. (Original) The method of claim 5, further comprising, before traversing the binary tree, trimming the binary tree by deleting all nodes not on a path between the root node and any leaf node representing a determined host address.

10. (Previously Presented) A computer-readable medium whose contents cause a data processing system to identify subnet address ranges for subnets being used in a network by:

receiving a plurality of addresses of hosts in the network;

accessing a binary tree, the binary tree having a root node having no parents, parent nodes including the root node each having a pair of child nodes, and leaf nodes having no child nodes, such that the root node represents the entire range of addresses available in the network, such that each child node in a pair of child nodes represents a distinct half of the range represented by the parent node of the pair of child nodes, and such that each leaf node represents a single network address that is within the address ranges represented by all of the ancestors of the leaf node, each received host address being represented by a leaf node;

traversing the binary tree in preorder to identify candidate nodes such that both child nodes of each candidate node have one or more descendant leaf nodes representing a received host address;

testing the address range represented by each candidate node in the traversal visited to determine whether the address range is a subnet address range for a subnet being used in the network;

if testing indicates that a visited candidate node represents an address range that is a subnet address range for a subnet being used in a network, identifying the visited candidate node as a subnet node; and

skipping, in the traversal, any candidate nodes that are descendants of an identified subnet node.

11. (Original) The computer-readable medium of claim 10 wherein testing comprises, for the two subranges represented by the child nodes of the candidate node:

sending one or more packets each from a source address to a destination address, each packet requesting a reply, the source and destination addresses being in different subranges for each packet;

for each packet, determining whether a reply to the packet is sent directly from the destination address back to the source address; and

if, for a number of packets exceeding a threshold number, a reply to the packet is sent directly from the destination address back to the source address, determining that the candidate node represents an address range that is a subnet address range for a subnet being used in a network.

12. (Original) The computer-readable medium of claim 10 wherein testing comprises, for the two subranges represented by the child nodes of the candidate node:

selecting the address within each subrange that is closest to the addresses of the other subrange;

determining whether the network contains a host responding to either of the selected addresses; and

if the network contains a host responding to either of the selected addresses, determining that the candidate node represents an address range that is a subnet address range for a subnet being used in a network.

13-20. (Cancelled)

21. (Previously Presented) A computer memory containing a subnet identification tree data structure for use in identifying a subnet in a network, a range of addresses being available in the network, some of the addresses available in the network being host addresses, the a subnet identification tree data structure comprising:

a root node having a pair of child nodes, the root node representing the entire range of addresses available in the network;

a plurality of intermediate nodes each having one parent node and a pair of child nodes, the root node and the intermediate nodes each having a pair of child nodes, each child node in a pair of child nodes representing a distinct half of the range represented by the parent node of the pair of child nodes; and

a plurality of leaf nodes having no child nodes, each leaf node representing a single network address that is within the address ranges represented by all of the ancestors of the leaf node, each host address being represented by a leaf node, so that the subnet identification tree data structure may be traversed to identify an intermediate node representing an address range corresponding to a subnet in the network.

22. (Previously Presented) The computer memory of claim 21 wherein the subnet identification tree data structure contains only nodes that are on a path from the root node to one of the leaf nodes representing a host address.

23. (Previously Presented) The computer-readable medium of claim 10 wherein the contents of the computer-readable medium further cause the data processing system to trim the binary tree by deleting nodes not on the path between the root node and any leaf nodes representing a received host address before traversing the binary tree.

24. (Previously Presented) The computer-readable medium of claim 10 wherein the contents of the computer-readable medium further caused the data processing system to trim the binary tree by deleting all nodes not on the path between the root node and any leaf nodes representing a received host address before traversing the binary tree.

25. (Previously Presented) A data processing system for identifying subnet address ranges for subnets being used in a network, comprising:

a receiver that receives a plurality of addresses of hosts in the network;

a tree memory storing a binary tree, the binary tree having a root node having no parents, parent nodes including the root node each having a pair of child nodes, and leaf nodes having no child nodes, such that the root node represents the entire range of addresses available in the network, such that each child node in a pair of child nodes represents a distinct half of the range represented by the parent node of the pair of child

nodes, and such that each leaf node represents a single network address that is within the address ranges represented by all of the ancestors of the leaf node, each determined host address being represented by a leaf node; and

a tree traversal subsystem that traverses the binary tree stored in the tree memory in preorder, skipping any candidate nodes that are descendants of an identified subnet node, to identify candidate nodes such that both child nodes of each candidate node have one or more descendent leaf nodes representing a determined host address, that tests the address range represented by each visited candidate node to determine whether the address range is a subnet address range for a subnet being used in the network, and that identifies a visited candidate node as a subnet node if testing indicates that the visited candidate node represents an address range that is a subnet address range for a subnet being used in the network.

26. (Previously Presented) The data processing system of claim 25, further comprising a tree trimming subsystem that, before the tree traversal subsystem traverses the binary tree, trims the binary tree by deleting nodes not on the path between the root node and any leaf node representing a determined host address.

27. (Previously Presented) The data processing system of claim 25, further comprising a tree trimming subsystem that, before the tree traversal subsystem traverses the binary tree, trims the binary tree by deleting all nodes not on the path between the root node and any leaf node representing a determined host address.

28. (New) A method in a computing system for identifying subnet address ranges for subnets being used in the network, comprising:

accessing a binary tree data structure, each node of the tree representing a range of one or more valid addresses in the network, each ancestor node representing all of the addresses represented among its descendants;

performing an incomplete preorder traversal of the nodes of a binary tree data structure representing valid addresses in the network, at each node visited in the traversal testing the address range represented by the node to determine whether the address range is a subnet address range for a subnet being used in the network; and

for each node whose represented address range the testing indicates is a subnet address range for a subnet being used in the network, identifying the address range represented by the node as a subnet address range.

29. (New) The method of claim 28 wherein the traversal does not visit any node that is a descendent of a node whose represented address range testing indicates that it is a subnet address range for a subnet being used in the network.

30. (New) The method of claim 28 wherein the traversal does not visit any leaf nodes or parents of leaf nodes.

31. (New) The method of claim 28, further comprising receiving addresses of a plurality of hosts operating in the network, wherein the traversal visits only nodes both of whose children have at least one leaf node descendent representing an host address among received host addresses.

32. (New) The method of claim 28, further comprising receiving addresses of a plurality of hosts operating in the network wherein the testing comprises, wherein the testing comprises determining whether a least a threshold fraction of reply packets each sent between addresses represented by leaf nodes that are descendents of different children of the tested node are sent directly between such addresses.

33. (New) A computer-readable medium whose contents cause a computing system for identifying subnet address ranges for subnets being used in the network, the method comprising:

accessing a binary tree data structure, each node of the tree representing a range of one or more valid addresses in the network, each ancestor node representing all of the addresses represented among its descendants;

performing an incomplete preorder traversal of the nodes of a binary tree data structure representing valid addresses in the network, at each node visited in the traversal testing the address range represented by the node to determine whether the address range is a subnet address range for subnet being used in the network; and

for each node whose represented address range the testing indicates is a subnet address range for a subnet being used in the network, identifying the address range represented by the node as a subnet address range.

34. (New) The computer-readable medium of claim 33 wherein the traversal does not visit any node that is a descendent of a node whose represented address range that testing indicates that it is a subnet address range for a subnet being used in the network.

35. (New) The computer-readable medium of claim 33 wherein the traversal does not visit any leaf nodes.

36. (New) The computer-readable medium of claim 33 wherein the method further comprises receiving addresses of a plurality of hosts operating in the network, and wherein the traversal visits only nodes both of whose children have at least one leaf node descendent representing an host address among received host addresses.

37. (New) The computer-readable medium of claim 33 wherein the method further comprise receiving addresses of a plurality of hosts operating in the network wherein the testing comprises,
and wherein the testing comprises determining whether a least a threshold fraction of reply packets each sent between addresses represented by leaf nodes that are descendents of different children of the tested node are sent directly between such addresses.